

THE OSTRACOD GENUS *TRACHYLEBERIS*

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THE OSTRACOD GENUS *TRACHYLEBERIS*

By J. P. HARDING AND P. C. SYLVESTER-BRADLEY

SYNOPSIS

When Brady erected the genus *Trachyleberis* for a species which he had described earlier as *Cythere scabrocuneata*, he had before him specimens from New Zealand which did not in fact belong to that species.

Both the type specimens of *Cythere scabrocuneata* and the specimens from New Zealand are in the British Museum (Natural History). A new name is proposed for the New Zealand species and full descriptions of the type specimens of both species are given: fortunately they are congeneric.

BRADY (1880) described the shell of a new species of ostracod, *Cythere scabrocuneata*, from specimens collected by the "Challenger" Expedition. Later he (Brady, 1898) described the limbs and other soft parts of further specimens from Lyttelton Harbour, New Zealand, which he thought belonged to the same species, and as the limbs showed some unusual features, he erected a new genus *Trachyleberis*. Müller (1912) and Skogsberg (1928) considered *Trachyleberis* to be synonymous with *Cythereis* Jones, but, as one of us has shown elsewhere (Sylvester-Bradley, 1948b), the shell of *Trachyleberis* differs significantly from that of *Cythereis*, and the genus was therefore revived, though without reference to the soft parts.

Some of the original "Challenger" material is preserved in the British Museum (Nat. Hist.) in the form of dry shells gummed to wooden microscope slides, and the Lyttelton Harbour material, consisting of several specimens of both sexes, is preserved in spirit in the Hancock Museum, Newcastle, and we are much indebted to the Curator, Mr. C. E. Fisher, for letting us examine this material. He has also graciously permitted some of the material to be kept at the British Museum. We also re-examined the "Challenger" specimens and found that some of what Brady refers to as "empty shells" had a few appendages still inside them; and by treating the whole ostracod with a 1% solution of tribasic sodium phosphate (Na_3PO_4) it has been possible to recover these appendages and make permanent mounts.

It is now quite evident that these "Challenger" specimens and the ones from New Zealand are different species, and that the Lyttelton Harbour specimens must be given a new name; we propose to call them *Trachyleberis lytteltonensis*.

It is unfortunate that the only specimens in the British Museum (Nat. Hist.) of the "Challenger" collections are from the Inland Sea of Japan, as Brady describes *C. scabrocuneata* from three different localities, the Bass Straits, the Inland Sea of Japan and Wellington Harbour, New Zealand, and it is quite possible that the Wellington Harbour specimens were the same species as those from Lyttelton Harbour, as both are from New Zealand harbours. Should these two species ever be put into different genera the name *Trachyleberis* will have to remain with the Japanese species, *T. scabrocuneata*, which must be based on the only available type

material. This is in spite of the fact that it was characters which Brady saw in the New Zealand specimens, now called *T. lytteltonensis*, which led him to erect his new genus.

The present paper attempts to describe these two species. Although it is intended as a contribution to the taxonomy of the genus, we do not append a formal diagnosis. We feel that as yet too few species are known by the details of both shell and soft parts.

As the specimens from Lyttelton Harbour are more complete they will be described first.

TRACHYLEBERIS Brady, 1898

Type-species (by monotypy) : *Cythere scabrocuneata* Brady, 1880.

Trachyleberis lytteltonensis sp. nov.

(Text-figs. 2-19 ; Pl. 1, figs. 1-4, 7 ; Pl. 2, figs. 1-4, 7, 8)

Trachyleberis scabrocuneata, Brady, 1898, Trans. Zool. Soc. Lond. **14** : 444, pl. 47, figs. 1-7, 18-25.

Trachyleberis scabrocuneata, Hornibrook, 1952, New Zealand Geol. Surv., Palaeont. Bull. **18** : 32-33, pl. 3, figs. 38, 39, 48.

MATERIAL. About 40 specimens preserved in spirit from the Brady collection, Hancock Museum, Newcastle-on-Tyne, dredged at 1-5 fathoms from Lyttelton Harbour, New Zealand. The holotype and other figured specimens have been mounted, and through the generosity of the Hancock Museum are now kept at the British Museum (Nat. Hist.); these bear the following registered numbers: 1952.12.9.1-12.

OCCURRENCE. In addition to its occurrence in the type locality *T. lytteltonensis* has been reported by Hornibrook (1952, pp. 69, 71, under the name "*T. scabrocuneata*") from four stations in the seas of the New Zealand area dredged at depths ranging from 28-67 fathoms, and from one fossil locality in the Upper Miocene (Tongaporutnan) of New Zealand.

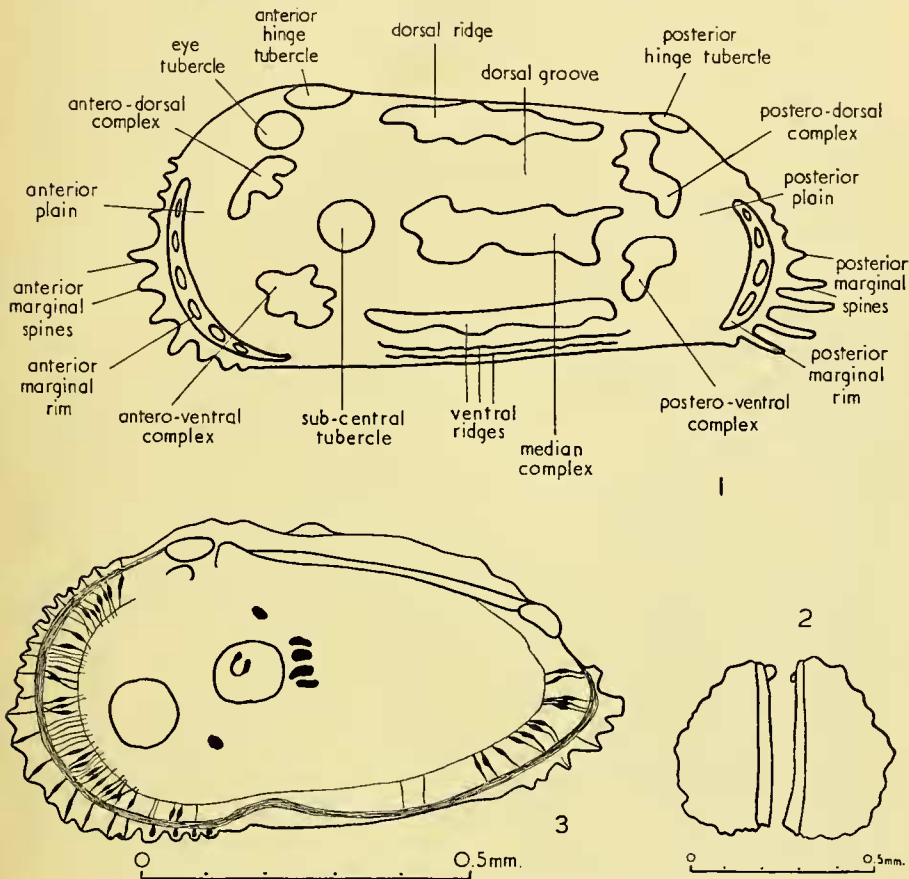
HOLOTYPE. Male, B.M. 1952.12.9.1.

PARATYPES. Both sexes, B.M. 1952.12.9.2-12.

DESCRIPTION. The carapace is subrectangular in lateral outline, with the dorsal and ventral borders nearly straight, and converging but slightly towards the posterior (Pl. 1, figs. 1-4). The anterior border is rounded, the posterior triangular, the postero-dorsal margin being straight or slightly concave, the postero-ventral margin curving evenly into the ventral margin. Sexual dimorphism is strong, the males being longer in proportion than the females (see table below). In dorsal view (Pl. 2, figs. 1-4) the carapace is seen to be widest in the region of the sub-central tubercle, and is compressed in the regions of the anterior and posterior plains. In end view (Text-fig. 2) the carapace appears approximately triangular, both valves showing a fairly abrupt ventral angulation, and the venter being almost

flat. The left valve is larger than the right, its selvage fitting outside that of the right throughout its course.

	Length	Height	Width (of complete carapace)
Dimensions: ♂ B.M. 1952.12.9.1	1.08 mm.	0.49 mm.	0.49 mm.
♀ B.M. 1952.12.9.6	0.90 "	0.49 "	0.49 "
Proportions: ♂ B.M. 1952.12.9.1	2.21	1	1.00
♀ B.M. 1952.12.9.6	1.84	1	1.00



TEXT-FIG. 1. Diagram to illustrate the terms used in the description of the external ornament of the carapace in the Trachyleberidae.

TEXT-FIG. 2. *Trachyleberis lytteltonensis* sp. nov. Profile in end view from the posterior. B.M. 1952.12.9.6.

TEXT-FIG. 3. *Trachyleberis lytteltonensis* sp. nov. Internal lateral view of right valve. B.M. 1952.12.9.6.

The following analysis of the ornament (see Pl. 1, figs. 1-4) follows a scheme previously put forward (Sylvester-Bradley, 1948a) illustrated by Text-fig. 1. Eye tubercles are prominent on both valves, and run into the antero-dorsal complex, which consists of a simple swelling. The sub-central tubercle forms a prominent mammillated boss, and the antero-ventral complex consists of four tubercles. Behind the sub-central tubercle the ornament is not clearly divided into ridges and complexes, but consists of a number of tubercles, which have a tendency to bear slightly mammillated summits (this character is not well shown by the photographs reproduced in Pl. 1, which are of specimens coated with magnesia). There are three ventral ridges, the uppermost bearing elongated tubercles. The anterior marginal spines are divided into two groups, a dorsal set of smaller rounded spines, and a ventral set of larger more pointed spines. The anterior marginal rim is composed of a double line of tubercular spines, which supplement the armature of the margin. The posterior marginal spines are prominent in the ventral region, but almost absent dorsally. The posterior marginal rim is less well developed than the anterior, and is armed with fewer tubercles. The anterior hinge tubercle lies behind and above the eye tubercle in both valves, and the posterior hinge tubercle of the left valve forms a prominent swelling near the commissure, best seen in dorsal view.

The duplicature is fairly wide, extending 0.05 mm. inwards from the selvage in anterior and postero-ventral regions, and up to 0.07 mm. at the posterior extremity. The selvage is prominent in both valves, and follows a sinuous course along the ventral margin, being markedly concave to the exterior in the centre of the venter. There is no vestibule.

Radial pore canals (Text-fig. 3; Pl. 1, fig. 7) run to each marginal spine and to each tubercle of the marginal rim. Some (presumably those serving the marginal spines) terminate along the inner margin; others (presumably those serving the rim) terminate on the inner surface of the shell just inside the inner margin. The total number of radial pore canals is therefore rather large, and they appear crowded, and sometimes superimposed in lateral view. Most of them are inflated towards the middle. The normal pore canals are few in number, one serving each tubercle of the ornament in the same manner as the radial canals.

The sub-central tubercle appears as a muscle scar pit on the inside of the valve (Text-fig. 3). The muscle scar pattern is that characteristic of so many of the superfamily, with four slightly elongated scars, lying vertically above each other, to the posterior of the pit, and a single scar, U-shaped, opening upwards, within the pit. In addition there are two other scars, one above and one below the main group. Each scar is raised as a tubercle on the inside of the valve.

The antero-ventral complex forms a pit on the inner surface of the valve similar in nature to the muscle-scar pit (Text-fig. 3).

The hinge of the left valve (Pl. 2, figs. 1-4, 7, 8) consists of two terminal slightly elongated sockets, unbounded on the ventral side, and a median element subdivided into an anterior rounded projecting tooth and an adjoining posterior finely crenulated bar. In the right valve the anterior tooth projects beyond a less strongly projecting

base. The posterior element is a slightly elongated lip-like tooth. The median element is a groove subdivided as in the left valve to provide a deep anterior socket, open ventrally, behind the anterior tooth.

In both valves a hollow lying immediately below and in front of the anterior hinge element leads to the eye tubercle, and is for the reception of the eye of the animal. The tubercle, being highly polished and transparent, perhaps serves as a primitive lens.

The first antenna (Text-fig. 4) consists of six segments and is the same in both sexes. The proportionate lengths of the segments and of the various setae, spines and sense organs are best indicated by the drawing. The first segment has a tuft of long spinules on the posterior face near the base. The second segment has a few spinules on both posterior and anterior faces, and on the postero-distal corner there is a slender, flexible, finely-haired seta. The third segment has a tapering seta on the antero-distal corner. The fourth segment has two smooth setae on the antero-distal corner, one stout and the other more slender, and from the middle of the distal edge on the medial side is a smooth, slender seta. The fifth segment has two stout setae and a slender one near the antero-distal corner, and one slender one on the distal edge on the medial side. These four are all smooth. The last segment has two stout terminal setae; and a slender one which is united at its base to a sense club (*s.*).

The second antenna (Text-figs. 5 and 6) consists of a protopod (*p.*) of one segment, an endopod (*en.*) of three segments, and a very small exopod (*ex.*) of two segments, and is alike in both sexes except for the small differences in the exopod. The protopod is quite unarmed. The exopod is reduced to what appears to be a sense organ. This is best developed in the female (Fig. 6), where it is very thinly chitinized and rather broad, and is less than twice the length of the first segment of the endopod. In the male (Text-fig. 5) the exopod is shorter still and looks very like an ordinary seta. Brady (1898) describes the exopod as "a very short, falcate, urticating seta [in the female], which is absent in the male."

The first segment of the endopod bears some stiff bristles and a long slender seta with very minute hairs on the postero-distal corner. The second segment of the endopod bears a tuft of hair-like spinules on its first quarter on the inner side. About two-thirds along its length there are two smooth setae on its anterior face, and on the posterior face at about this level there is one stout, tapering seta, and one longer but more slender one, both feathered, and near them a sense club (*s.*). At the postero-distal corner of this segment there is one stout, feathered seta and one small naked one. The last segment has three stout, naked setae, two together half-way along its posterior margin and the other one terminal.

The mandible (Text-fig. 8) is the same in both sexes. The shape of the basal biting part is shown in the figure. The biting edge contains six strong teeth each with a secondary cusp. The most anterior of these teeth is the largest, and they decrease in size gradually towards the posterior corner; the first two take up half the biting edge. There is a bristle between the first and second and another between the second and third teeth, and on the posterior medial corner beyond the largest tooth there are two ribbon-like bifurcate setae which are about twice the length of

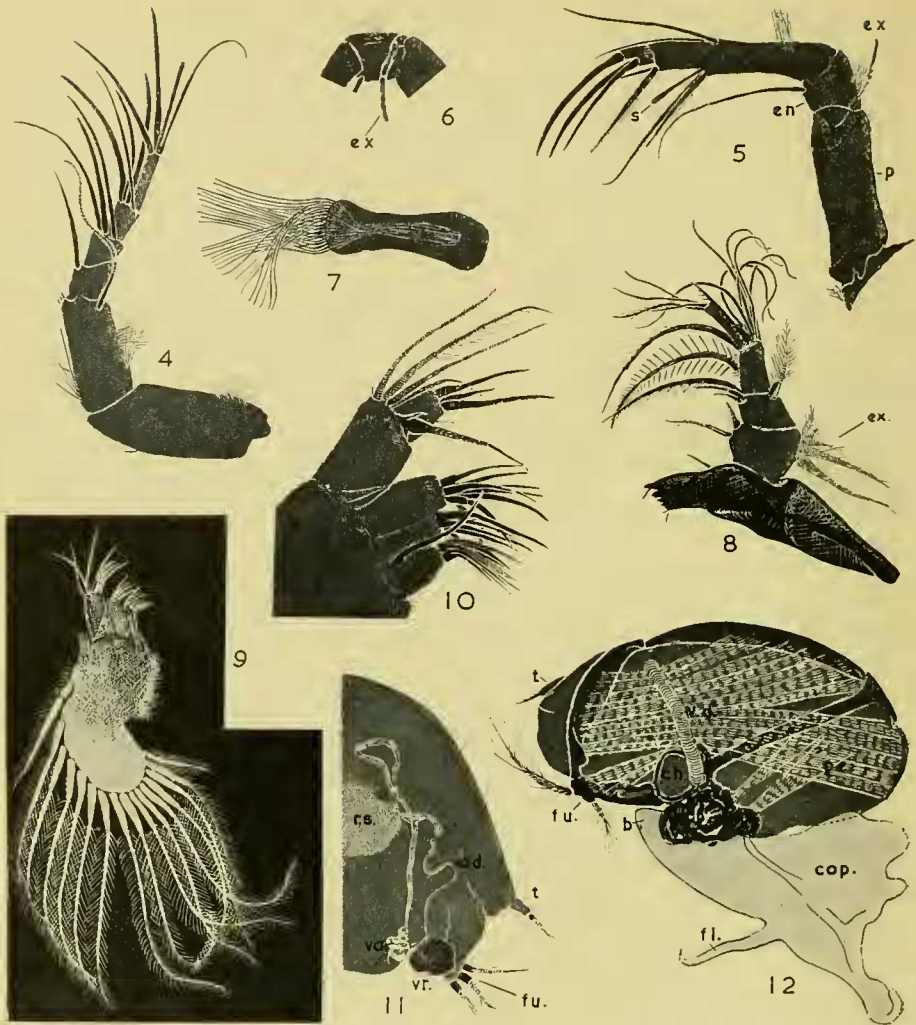
TEXT-FIGS. 4-12. *Trachyleberis lytteltonensis* sp. nov.

Fig. 4, first antenna, $\times 130$. Fig. 5, second antenna of male, $\times 130$. Fig. 6, part of second antenna of female with exopod, $\times 180$. Fig. 7, brush-shaped organ of male, right member from behind, $\times 360$. Fig. 8, right mandible from inner side, $\times 130$. Fig. 9, left maxilla from outer side, $\times 130$. Fig. 10, palp and endites of left maxilla from outer side, $\times 220$. Fig. 11, posterior part of body and copulatory apparatus of male, $\times 130$. *b.*, postero-ventral corner of copulatory appendage; *ch.*, chamber; *cop.*, copulatory appendage; *en.*, endopod; *ex.*, exopod; *fl.*, flagellum; *fu.*, furcal ramus; *ly.*, labyrinth; *od.*, oviduct; *p.*, protopod; *pe.*, penis; *r.s.*, receptaculum seminis; *s.*, sense club; *t.*, terminal seta; *va.*, vagina; *v.d.*, vas deferens; *vr.*, verruca.

the teeth near them. Beyond them again there is a single bent seta. Between the biting edge and the palp there is a seta with a few hairs.

The palp consists of the second segment of the protopod bearing a three-segmented endopod and an exopod of one segment. The exopod rises from the dorsal part of the outer face of the protopod and is directed distally. It consists of a single rounded segment narrow at its base, with five carrot-shaped, hairy setae which are thinly chitinized and of very different lengths, as shown in the figure.

The ventral margin of the protopod carries two delicate setae. The one nearest the distal corner is more or less parallel to the endopod and is shorter and stouter than the other. Both are annulated and hairy.

The first segment of the endopod has an annulated hairy seta on the inside of the distal dorsal corner, and on the ventral distal corner there are four setae, of which the two medial ones are small. The two on the outer side are stout and curved and are armed with long, stiff hairs which are rather wide apart. In preparations these are most evident in the outer seta, in which the hairs lie parallel to the cover slip. On the dorsal part of the distal end of the next segment is a group of seven whip-like, flexible, naked setae, and on the ventral distal corner there is a long tapering seta with hairs. On the medial side in the middle of the distal edge there is a seta which is a little longer than the terminal segment and has a few stiff hairs on the ventral side.

The terminal segment of the endopod is a little longer than the preceding one, but rather less than half its diameter and slightly tapering. It has four slender terminal setae, one of which has hairs.

The maxilla (Text-figs. 9, 10) is the same in both sexes. Between the long, plumose setae of the vibratory plate and the palp on the distal edge of the appendage there is a hairy swelling with a group of bristles directed parallel to the palp. The first of the 16 plumose setae arises from this swelling. This seta is constricted into two parts, both of which are rather swollen. The distal part tapers to a point. The second to the fifteenth plumose setae are longer and very much alike. They have a swollen basal part rather longer than the corresponding basal part of the first seta, and the distal part is not swollen but long and feathered. The sixteenth seta is much smaller than the others but hardly longer than the basal part of the middle 14, and it appears to be of one piece without a constriction.

The palp is composed of two more or less cylindrical segments, the first segment being about twice the length and twice the width of the second. On the distal edge of the first segment and dorsal to the second segment are four slender setae differing from each other in hairiness. That next to the second segment is the shortest, being about twice the length of the second segment; it has minute hairs all round it. The other three setae are all nearly twice this length; one appears to be naked, the second has rather short hairs, and the other has long hairs; these three are annulated for the distal part of their length. In addition to these setae, the distal margin of the first segment carries a seta near the outer face of the second segment. This seta has a swollen base from which arises a short secondary setule.

There are three distinct endites, the first, i.e., the one nearest the palp, bears terminally eight tapering setae, many of which have swollen bases. These are all

naked or nearly so. The two other endites have several pointed terminal setae, the actual number being difficult to determine. In addition to these terminal setae, the last endite has a fairly long seta arising from near its base on the side facing the palp.

The fifth, sixth and seventh pairs of appendages are basically similar to one another. They are all leg-like, and will be referred to here as the first, second and third pairs of legs. Each of the three pairs shows sexual dimorphism, and furthermore, in the first pair of legs of the male the right leg differs from the left leg. The following description will apply to both sides and both sexes unless otherwise indicated.

The first leg (Text-figs. 13-15) consists of four segments. The first segment has two annulated setae on the anterior margin and two on the antero-distal corner overhanging the knee-like joint. Near the base of the leg on the posterior side there is a soft, hairy, carrot-shaped seta, and near it along the posterior margin of the segment there are some long hairs. The postero-distal corner of the first segment has a hollow surrounded by fine spinules. The second segment broadens distally and carries one seta. This is on the antero-distal corner in the female (Text-fig. 13), and carries short hairs. In the male this seta is more hairy and placed on the anterior margin short of the corner, and is farther from the corner on the right leg (Text-fig. 14) than on the left (Text-fig. 15). Apart from a few minute spinules the right leg of the male bears nothing else on the second segment, but on the left leg of the male there is a swelling in about the middle of the anterior margin. This carries a roughened friction pad on the medial side and a hairy boss on the outer side. In the female (Text-fig. 13) there is a group of spinules on this part of the anterior margin. The third and fourth segments of the leg are the same in both sexes and on both sides. The distal edge of each segment is armed with small spinules on both sides; these are much longer laterally than medially. The terminal curved claw is about twice the length of the last segment and is smooth in the male and pectinate on the inside of the curve in the female.

The second pair of legs (Text-figs. 16, 17) is sexually dimorphic, but in the male as well as in the female the left and right legs form a symmetrical pair. The first segment is the same in both sexes, and has similar setae to those of the first leg except that only one seta overhangs the "knee." The second segment broadens gradually distally, and is nearly as long as the first segment but much narrower. It bears an annulated seta on the antero-distal corner, and in the male (Text-fig. 17) three groups of stiff, sharply-pointed bristles; in the female (Text-fig. 16) only the most proximal of these three groups is present. The third and fourth segments are similar to those of the first leg but rather longer and more slenderly built. The claw is smooth in the male and pectinate in the female.

The third pair of legs (Text-figs. 18, 19) is essentially similar to the second pair. The first segment has a normal annulated seta on the postero-proximal corner instead of the carrot-shaped seta. In the male the second segment has four groups of conspicuous, straight, sharply-pointed bristles on the anterior margin; only the two most proximal of these groups are represented in the female, and in this sex the bristles are more flexible. The seta on the antero-distal corner is long,

and in the male, crooked. The male has a group of slender-pointed spines on the middle of the anterior margin of the last segment. The terminal claw is pectinate in both sexes.

The copulatory apparatus is of the usual complex nature. Specimens were unfortunately not well enough preserved for the details of the softer parts to be made out. The structure of the less easily macerated parts is shown in Text-fig. 12. The following features were found in each of five males examined. On each side the apparatus consists of two parts, a roughly oval muscular part called by Skogsberg (1928) and others the "penis" (*pe.*) and a distal triangular "copulatory appendage" (*cop.*). The muscular part contains a number of chitinous struts with muscles running between them as shown. Near the base of the copulatory appendage there is a very complex labyrinth (*ly.*) with a rounded chamber (*ch.*) which has chitinous walls. A tube with spirally thickened walls, presumably the vas deferens (*v.d.*), runs to this chamber. The other end of the tube was found in very different positions in different specimens, having apparently become free as a result of maceration of the soft parts; but the position figured is believed to be correct. The copulatory appendage is a thin-walled, roughly triangular organ with irregular outgrowths from its broader distal part. These outgrowths are roughly similar on both sides; but those of the same side of two different individuals are usually more alike than the right and left ones of the same individual. The appendage on the right has a flagellum (*fl.*) which is absent on the left. The "postero-ventral" part of the copulatory appendage ends with a rounded point (*b.*). We were unable to determine a ductus ejaculatorius.

The female reproductive system and the shape of the posterior part of the body are shown in Text-fig. 11. On each side of the body near the caudal furca, which in this sex has three setae, lies the verruca (*vr.*). The oviduct (*od.*) is a sinuous tube connected with the verruca. The vagina (*va.*) is separate from the oviduct and opens anterior to it. Both these ducts are connected with the receptaculum seminis (*r.s.*). The receptaculum and the other organs are all paired.

The paired brush-shaped organs of the male (Text-fig. 7) are placed on the ventral side of the body between the "knees" of the first pair of legs.

The furcal rami (*fu.*) are reduced to a simple swelling on each side bearing three setae in the female and two setae in the male. In both sexes the hindermost part of the body bears a single median seta (*t.*).

Trachyleberis scabrocuneata (Brady)

(Text-figs. 20-25; Pl. 1, figs. 5, 6, 8; Pl. 2, figs. 5, 6, 9, 10.)

Cythere scabrocuneata Brady, 1880, Challenger Rep. 1: 103, pl. 17, figs. 5a-f; pl. 23, figs. 2a-c.

Not *Trachyleberis scabrocuneata*, Brady, 1898, Trans. zool. Soc. Lond. 14: 444, pl. 47, figs. 1-7, 18-25.

Trachyleberis scabrocuneata, Sylvester-Bradley, 1948, J. Paleont. 22: 794, pl. 122, figs. 13-18.

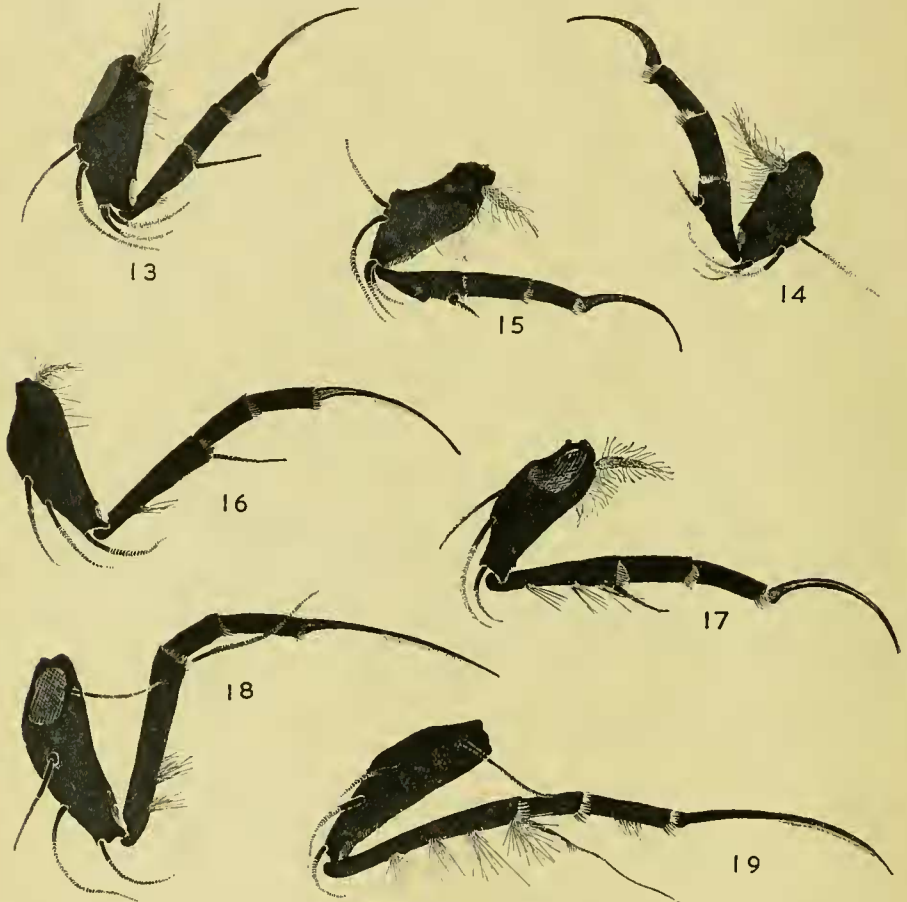
Not *Trachyleberis scabrocuneata*, Hornibrook, 1952, New Zealand Geol. Surv., Palaeont. Bull. 18: 32-33, pl. 3, figs. 38, 39, 48.

OCCURRENCE AND MATERIAL. The only material that has survived is that dredged by the "Challenger" Expedition from the Inland Sea of Japan at 14 fathoms. The following specimens are held in the British Museum (Nat. Hist.):

LECTOTYPE (here chosen) B.M. 1952.12.10.1, 2.

PARATYPES: B.M. 1948.3.10.1-5, B.M. 1952.12.10.3-9.

OTHER RECORDS. Brady's other records of this species are suspected to be *T. lytteltonensis* or other species.



TEXT-FIGS. 13-19. *Trachyleberis lytteltonensis* sp. nov.

Fig. 13, left first leg of female, $\times 180$. Fig. 14, right first leg of male, $\times 145$. Fig. 15, left first leg of male, $\times 145$. Fig. 16, left second leg of female, $\times 180$. Fig. 17, left second leg of male, $\times 145$. Fig. 18, left third leg of female, $\times 180$. Fig. 19, left third leg of male, $\times 145$.

DESCRIPTION. The shell of this species has been previously described (Sylvester-Bradley, 1948*b*) on the basis of the type material here re-examined, and only such details as serve to distinguish the species from *T. lytteltonensis* need be dealt with again. The shell of the species has been refigured on Pls. 1 and 2 to aid comparison.

There are no differences to report in the general shape of the carapace, the degree of sexual dimorphism, or the size. In the following table of dimensions and proportions, those of the complete carapaces have been estimated from single valves :

		Length	Height	Width
Dimensions :	♂ B.M. 1948.3.10.1 .	1.10 mm.	0.52 mm.	0.49 mm.
	♀ B.M. 1948.3.10.5 .	0.90 „	0.46 „	0.46 „
Proportions :	♂ B.M. 1948.3.10.1 .	2.13	1	0.94
	♀ B.M. 1948.3.10.5 .	1.94	1	1.00

The antero-dorsal complex of *T. scabrocuneata* (Pl. 1, figs. 5, 6, 8) consists of a sharp ridge running from the eye tubercle forwards and downwards to as far as the median line, and presents an immediate contrast to the rounded swelling which forms the antero-dorsal complex of *T. lytteltonensis*. Similarly the sub-central tubercle of *T. scabrocuneata* is surmounted by ridge-like elevations rather than the mammillae of *T. lytteltonensis*. The general style of ornament is similar in the two species, but the tubercles in *T. scabrocuneata* are smaller, more sharply defined and greater in number than in *T. lytteltonensis*. In *T. scabrocuneata* the marginal spines in the postero-ventral region, forming a ventral ridge, are compressed and blade-like, and swell out above the base (Pl. 2, figs. 9 and 10). It is interesting to note that a third species, *T. thomsoni* Hornibrook, 1952, ranging in New Zealand from the Paleocene (Waipawan) to Recent, as shown by Hornibrook's figures, is also similar in style of ornament, but the tubercles are even fewer, and are more pronounced, rising from dorsal and ventral ridges as veritable spines.

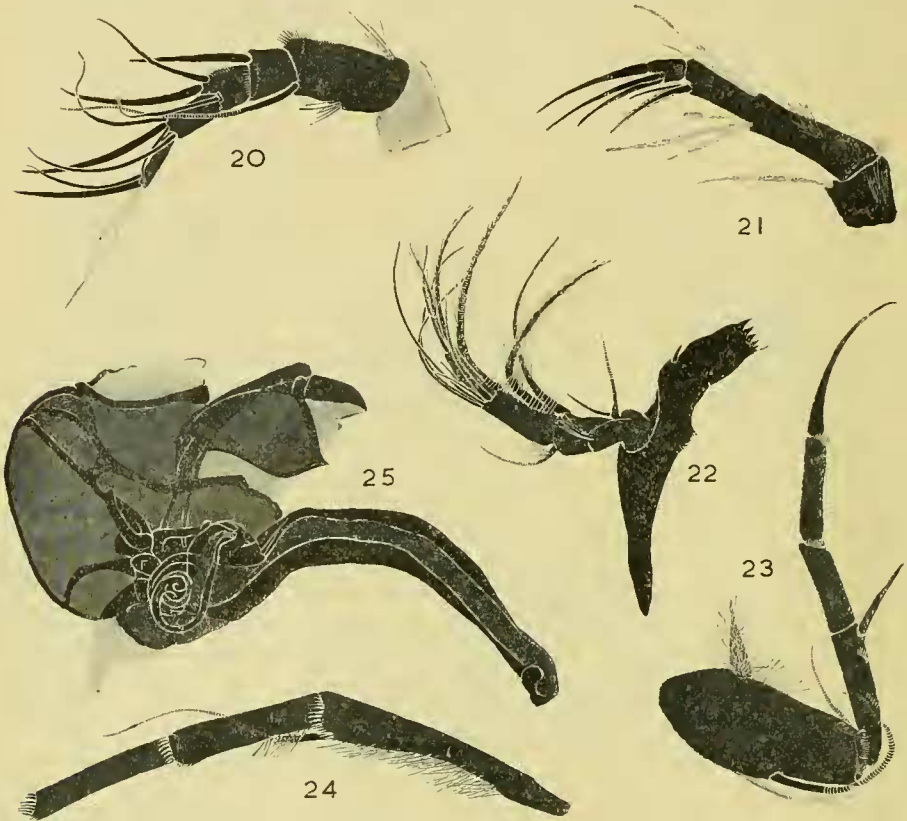
The internal characters of the carapace (Pl. 2, figs. 5, 6, 9 and 10) are essentially similar to those displayed by *T. lytteltonensis*. The anterior tooth of the right valve, however, projects far more strongly above its base than that of *T. lytteltonensis* (Pl. 2, fig. 6).

The first antenna of the female is shown in Text-fig. 20. This drawing has been made with the aid of a camera lucida, but antennules from three separate females have been used in order to include as many setae as possible. In none of the specimens was the basal segment or the terminal seta with attached sense club present. Lightly stippled "ghosts" of these have been added to the drawings by analogy with the other species. As will be seen by comparing Text-fig. 20 with Text-fig. 4 the first antennae of the two species are practically identical. The second antennae also appear to be identical in the two species (compare Text-fig. 21 with Text-fig. 5). Only the three terminal segments of this appendage with the five most terminal setae are preserved, however, and we could find no exopod.

The mandible (Text-fig. 22) is similar in the two species, though the palp has less than seven whip-like setae on the posterior side of the penultimate segment, but this may have been because some of the setae had been lost. The palps of two mandibles

were recovered, but unfortunately in both examples the first segment of the palp was rather distorted and in neither was it possible to see the exopod.

A number of parts of the legs were preserved, but the only complete one is the



TEXT-FIGS. 20-25. *Trachyleberis scabrocuneata* Brady. Type material.

Fig. 20, first antenna of female, $\times 165$, drawn from three specimens. Fig. 21, second antenna, $\times 165$, from two specimens. Fig. 22, mandible, $\times 165$. Fig. 23, second leg of female, $\times 260$. Fig. 24, three segments of the third leg of a male, $\times 260$. Fig. 25, copulatory apparatus of male, $\times 260$, drawn from three specimens.

Segments and setae shown lightly stippled were missing in the specimens seen, and have been added by analogy with the other species.

second left leg of a female shown in Text-fig. 23. Instead of the group of bristles present on the proximal third of the second segment as in *T. lytteltonensis*, there are two groups of short spinules placed laterally. Otherwise there seems to be no difference of any importance. Three segments of the third right leg of the male

are shown in Text-fig. 24. These are very similar to the corresponding segments of *T. lytteltonensis* (Text-fig. 22), and the ventral margins of the second and third segments are hairy. These hairs, however, do not seem to be arranged in distinct groups as they are in *T. lytteltonensis*.

The copulatory apparatus (Text-fig. 25), of which no less than three specimens were preserved, is quite unlike that of *T. lytteltonensis* (compare Text-fig. 25 with Text-fig. 12). None of the three specimens was sufficiently well-preserved to show the muscles, but all three were remarkably like one another; two of the three were right- and left-hand members of one specimen. The apparatus in the two species is so different that it is difficult to homologize the parts. In *T. scabrocuneata* there is a distinctly spiral ejaculatory duct which could not be seen in *T. lytteltonensis*. The distal parts of the copulatory appendage in *T. scabrocuneata* is a long, rather curved organ with heavily chitinized walls, as shown in the figure, and very different from the broadly expanded, laminate and delicately-built organ of *T. lytteltonensis*.

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EXPLANATION OF PLATES

PLATE 1

All external lateral views. All figures except fig. 7 from retouched photographs of specimens coated with magnesium oxide, $\times 60$. Fig. 7 from an unretouched photograph, $\times 120$, of a specimen immersed in benzyl alcohol and illuminated by transmitted light.

FIGS. 1-4, 7. *Trachyleberis lytteltonensis* sp. nov. Figs. 1, 2, B.M. 1952.12.9.1 (δ); figs. 3, 4, 7, B.M. 1952.12.9.6 (φ).

FIGS. 5, 6, 8. *Trachyleberis scabrocuneata* (Brady). Fig. 5, B.M. 1948.3.10.1 (δ); fig. 6, B.M. 1948.3.10.2 (δ); fig. 8, B.M. 1948.3.10.5 (φ).

PLATE 2

All figures are from retouched photographs, $\times 60$. Figs. 1-6, dorsal views; figs. 7-10, internal lateral views.

FIGS. 1-4, 7, 8. *Trachyleberis lytteltonensis* sp. nov. Figs. 1, 2 B.M. 1952.12.9.1 (δ); figs. 3, 4, 7, 8, B.M. 1952.12.9.6 (φ).

FIGS. 5, 6, 9, 10. *Trachyleberis scabrocuneata* (Brady). Figs. 5, 9, B.M. 1948.3.10.1 (δ); figs. 6, 10, B.M. 1948.3.10.5 (φ).